E. EARTH AND SPACE SCIENCE

***Content Standard**:* Students in Wisconsin will demonstrate an understanding of the structure and systems of the earth and other bodies in the universe and their interactions.

***Rationale**:* By studying the earth, its composition, history, and the processes that shape it, students gain a better understanding of the planet on which they live. Understanding these geologic, meteorological, astronomical, and oceanographic processes allows students to make responsible choices and to evaluate the consequences of their choices. In addition, all bodies in space, including the earth, are influenced by forces acting throughout the solar system and the universe. Studying the universe enhances students' understanding of the earth's origins, its place in the universe, and its future.

Performance Standards: By the end of grade four students will:	***Sample Alternate Performance Indicators:* (1-3 per standard)**	***Sample Performance Activities/Tasks:* (1-2 per indicator)**	***Sources of Data***
E.4.1. Investigate that earth materials are composed of rocks and soils and correctly use the vocabulary for rocks, minerals, and soils during these investigations[1]	1. Develop simple vocabulary for rocks, minerals, and soils[1] 2. Investigate that earth materials are composed of rocks, minerals, and soils[1]	1.a. Inspect and label examples of rocks, minerals and soils(2) 1.b. Classify examples of rocks, minerals and soils(2) 2.a. Complete a treasure hunt for earth materials(2)	
E.4.2. Show that earth materials have different physical and chemical properties, including the properties of soils found in Wisconsin[1]	1. Show that earth materials have different physical and chemical properties[2]	1.a. Through observations and hands-on experience, list properties of earth materials(1) 1.b. Create a demonstration to show physical or chemical properties (e.g., mix water and dirt)(2)	
E.4.3. Develop descriptions of the land and water masses of the earth and of Wisconsin's rocks and minerals, using the common vocabulary of earth and space science[1]	1. Describe the land and water masses of the earth and Wisconsin's rocks and minerals[1]	1.a. Draw pictures of land masses, water masses, rocks, and minerals(1) 1.b. Categorize pictures of land masses, water masses, rocks, and minerals(2) 1.c. Label pictures of land masses, water masses, rocks, and	

		minerals(1)	
E.4.4. Identify celestial objects (stars, sun, moon, planets) in the sky, noting changes in patterns of those objects over time[1]	1. Identify celestial objects in the sky[1] 2. Note change in patterns of celestial objects over time[2]	1.a. Draw pictures of celestial objects (1) 1.b. Create models of celestial objects (2) 1.c. Label pictures of celestial objects (1) 2.a. After visiting a planetarium or watching a video about celestial changes, draw pictures, make models, or create a time line to show changes over time(2)	
E.4.5. Describe the weather commonly found in Wisconsin in terms of clouds, temperature, humidity, and forms of precipitation, and the changes that occur over time, including seasonal changes[1]	1. Describe the weather commonly found in Wisconsin[1] 2. Describe the changes in the weather occurring over time [2]	1.a. Keep a journal to describe daily weather(1) 1.b. Keep a graph or chart of daily weather(2) 1.c. Use various resources (e.g., the Internet, encyclopedias, and personal experience) to compare weather commonly found in Wisconsin to the weather in the student's native country (2) 2.a. Using a daily journal or chart, compare weather in different seasons(2) 2.b. Create a graph to show changes in the weather over time (2)	
E.4.6. Using the science themes, find patterns and cycles in the earth's daily, yearly, and long-term changes[2]	1. Find patterns and cycles in the earth's daily, yearly and long-term changes[2]	1.a. Create a picture, physical model, or other visual to show the patterns or cycles of the earth's changes(2) 1.b. Identify patterns and cycles in the student's own life experience(3)	
E.4.7. Using the science themes, describe resources used in the home, community, and nation as a whole[1]	1. Identify resources related to science themes[1]	1.a. Brainstorm or complete a KWHL chart to list resources related to science themes(2) K = what you know W = what you want to know H = how will you find out L = what you learned	

	2. Describe resources used in a home[1] 3. Describe resources used in a community[1] 4. Describe resources used in a nation.[1]	2.a. Collect examples from home of resources related to the science themes(1) 3.a. Observe (through slides, field trips, and class guests) and record resources used in a community which relate to the science themes(1) 4.a. Using computers, contact other students around the nation to find examples of resources related to the science themes.(2)	
E.4.8. Illustrate resources humans use in mining, forestry, farming, and manufacturing in Wisconsin and elsewhere in the world[1]	1. Demonstrate an understanding of mining, forestry, farming, and manufacturing[2] 2. Illustrate resources humans use in these areas[1]	1.a. Demonstrate an understanding of mining, forestry, farming, and manufacturing(2) 2.a. Illustrate resources humans use in these areas(1)	
Performance Standards: By the end of grade eight students will:	***Sample Alternate Performance Indicators:* (1-3 per standard)**	***Sample Performance Activities/Tasks:* (1-2 per indicator)**	***Sources of Data***
E.8.1. Using the science themes, explain and predict changes in major features of land, water, and atmospheric systems[2]	1. Explain and predict changes in major features of land, water, and atmospheric systems[2/3]	1.a. Use U.S. Geological drawings to describe the formation of mountains (2/3) 1.b. Using drawings or models to describe the erosion of a mountain(2/3)	
E.8.2. Describe underlying structures of the earth that cause changes in the earth's surface[1]	1. Understand that the solid earth is layered with a thin, brittle crust, hot, convecting mantle, and dense, metallic core[1] 2. Describe the underlying structures of the earth that cause changes in the earth's surface[1]	1.a. Made a model of a cross section of the earth(1) 1.b. Participate in activities to show the effects of pressure on matter(1) 2.a. Demonstrate movements in the earth's crust using crackers and peanut butter to represent the earth's crust and mantle material(1)	
E.8.3. Using the science themes during investigations,	1. Using the science themes describe changes in the forces acting on the	1.a. Examine the effects of El Niño on global weather patterns(1/2)	

describe climate, weather, ocean currents, soil movements, and changes in the forces acting on the earth[1]	earth[1/2]	1.b. Examine the effects(1/2)	
E.8.4. Using the science themes, analyze the influence living organisms have had on the earth's systems, including their impact on the composition of the atmosphere and the weathering of rocks[3]	1. Investigate how living organisms have played many roles in the earth's system, including affecting the compositions of the atmosphere and contributing to the weathering of rocks[3]	1.a. Create a research question and describe how the evolution of plants has contributed to changes in the earth's atmosphere(3) 1.b. Create a research question and describe the impact of human activity on the atmosphere's composition (3)	
E.8.5. Analyze the geologic and life history of the earth, including changes over time, using various forms of scientific evidence[2]	1. Analyze the geologic and life history of the earth, including changes over time, using various forms of scientific evidence[2]	1.a. Make an illustrated timeline to describe the interactive relationship between the earth's geologic history and life history(2)	
E.8.6. Describe through investigation the use of the earth's resources by humans in both past and current cultures, particularly how changes in the resources used for the past 100 years are the basis for efforts to conserve and recycle renewable and nonrenewable resources[1]	1. Describe through investigation the use of the earth's resources by humans in both past and current cultures, particularly how changes in the resources used for the past 100 years are the basis for efforts to conserve and recycle renewable and nonrenewable resources [2]	1.a. Compare and contrast the use and availability of resources today and 100 years ago(2) 1.b. Compare and contrast the use and availability of resources in the United States and another country(2)	
E.8.7. Describe the general structure of the solar system, galaxies, and the universe, explaining the nature of the evidence used to develop current models of the universe[1]	1. Describe the general structure of the solar system, galaxies, and the universe[1]	1.a. Construct a model of the solar system(1) 1.b. Construct a model of a galaxy(1)	
E.8.8. Using past and current	1. Explain the daily, monthly, yearly	1.a. Maintain a journal of the cycles of the earth for one month.	

models of the structure of the solar system, explain the daily, monthly, yearly, and long-term cycles of the earth, citing evidence gained from personal observation as well as evidence used by scientists[2]	and long-term cycles of the earth citing evidence gained from personal observation as well as evidence used by scientists[2]	Include personal observations and scientific explanations(2)	
Performance Standards: By the end of grade twelve students will:	***Sample Alternate Performance Indicators:* (1-3 per standard)**	***Sample Performance Activities/Tasks:* (1-2 per indicator)**	***Sources of Data***
E.12.1. Using the science themes, distinguish between internal energies (decay of radioactive isotopes, gravity) and external energies (sun) in the earth's systems and show how these sources of energy have an impact on those systems	1. Use science themes to distinguish between internal and external energies	1.a. Use X-rays to show radiation identification of broken bones 1.b. Observe a video of dye injected into a body to identify a blockage (e.g., an angiogram). Report how the dye is observed and dispersed throughout the body	
E.12.2. Analyze the geochemical and physical cycles of the earth and use them to describe movements of matter	1. Analyze the geochemical cycle of the earth and use the cycle to describe movements of matter	1.a. Use photos of an island developed by volcanoes to chart changes in the island's formation 1.b. Draw what Wisconsin will look like in 50 million years based on an understanding of several of the geochemical cycles	
E.12.3. Using the science themes, describe theories of the origins and evolution of the universe and solar system, including the earth system as a part of the solar system, and relate these theories and their implications to geologic time on the earth	1. Using the science themes, describe theories of the origins and evolution of the universe and solar system, including the earth system as a part of the solar system, and relate these theories and their implications to geologic time on the earth	1.a. Use the "jigsaw" method for cooperative groups to research and defend various theories of the universe's formation 1.b. Create a concept map of the theories of evolution of the universe and compare the theories	

E.12.4. Analyze the benefits, costs, and limitations of past, present, and projected use of resources and technology and explain the consequences to the environment	1. Analyze the limitations of past resource usage and explain the environmental consequences 2. Analyze the limitations of present resource usage and explain environmental consequences 3. Analyze the costs of projected resource usage and explain the environmental consequences	1.a. Research and present accounts of various environmental mistakes made by countries. Show how technology and research have educated people to not abuse natural resources (e.g., allowing river water to flow back into rivers after being used by paper mills) 2.a. Research the rainforest and determine the implications of logging at the current rate. 3.a. Research a recycling plant and compare the costs of recycling paper to the costs of making new paper	
E.12.5. Using the science themes, understand that the origin of the universe is not completely understood, but that there are current ideas in science that attempt to explain its origin	1. Using the science themes, understand that the origin of the universe is not completely understood, but that there are current ideas in science that attempt to explain its origin	1.a. Use the “jigsaw” method for cooperative groups to research, present and defend various theories of the universe’s formation. Defend positions in an open debate. End by explaining that each theory or hypothesis does not completely explain the origin	